Claims:

1.   A method for providing rapid on-line analyses of chemical compositions utilizing near-infrared (NIR) spectroscopy in combination with chemometrics which comprises:

5   (a)   for each type of analysis to be conducted, providing a database by analyzing a series of samples using standard laboratory analytical procedures, utilizing the results as reference values to establish quantitative calibration models from NIR spectroscopy using chemometric techniques and storing this information in a computer database,

10   (b)   providing an NIR spectroscopic system comprising a transflectance or a transmittance probe coupled via fiber-optic cables to a stable white light source and a spectrograph,

(c)   inserting said probe into a chemical composition to be analyzed and beaming to said probe a stable white light of selected wavelength range and recording the

15   spectra obtained on the spectrograph, and

(d)   correlating the spectra obtained to the reference data stored in the computer to obtain a rapid measurement of the analysis desired.

2.   The method of claim 1 wherein said chemometric techniques are based on eigenvalue decomposition of a data matrix.

20   3.   The method of claim 2 wherein the eigenvalue decomposition determinations utilized principal component analysis (PCA) and partial least squares in latent variables (PLS).

4.   The method of claim 1 wherein the chemical composition comprises a chemical process stream.

25   5.   The method of claim 1 wherein the chemical composition is a test sample.

6.   The method of claim 1 wherein the analysis being conducted is the concentration of a component in the chemical composition.

7. The method of claim 1 wherein the analysis being conducted is the density of the chemical composition.

8. The method of claim 2 wherein the process stream is a solvent diluted froth stream obtained in the extraction of bitumen from oil sands.

5   9. The method of claim 8 wherein the asphaltenes content of the process stream is determined.

10. The method of claim 8 wherein the solvent-to-bitumen ratio of the process stream is determined.

11. The method of claim 8 wherein the density of the process stream is

10 determined.

12. The method of claim 8 wherein a stable white light of wavelength in the range 900 to 1700 nm is used.

13. The method of claim 9 wherein a stable white light of wavelength in the range 1000 to 1100 nm, is used.

15 14. The method of claim 10 wherein a stable white light of wavelength in the range 1040 to 1600 nm, is used.

15. The method of claim 11 wherein a stable white light of wavelength in the range 1000 to 1600 nm, is used.

16. The method of claim 12 wherein a light pass length in the range of 0.1 to

20 20 mm, is used.

17. The method of claim 1 wherein the NIR spectroscopy system used is highly stable and free of any moving parts.